

REMARKS

The applicant appreciates the Examiner's thorough examination of the application and requests reexamination and reconsideration of the application in view of the preceding amendments and the following remarks. The applicant also appreciate the examiner taking time to discuss this case by telephone with the applicant's attorney. Applicant has also enclosed new formal drawings so that the Examiner may better comprehend applicant's claimed inventive contribution to the art.

As explained to the examiner, the cited Boyce reference relates to a method of inserting reinforcing elements 14, Fig. 1, into a prepreg 30 to reinforce prepreg 30. The reinforcing elements, (e.g. boron rods) are first placed in thermally decomposable foam body 12.

Thermally decomposable foam body 12 is then placed on prepreg 30, heated, and subjected to elevated pressures (Fig. 5) so that the reinforcing elements are driven "into a composite structure [prepeg 30] as said thermally decomposable material collapses under the influence of said elevated temperature and pressure". Column 5, lines 46-64.

Then, the residue of the thermally decomposable foam body 12 is scrapped off! Column 4, line 2-6; Fig. 6.

This disclosure then, relates to a way of inserting reinforcing elements into one part to reinforce it.

In the applicant's present application, they disclose

joining two such reinforced composite structures. Each "adherend" has reinforcing elements injected through it-- using thermally decomposable foam as the insertion medium (per the Boyce patent) as but one way to accomplish this.

The applicants, however, realized and now claim that instead of rendering the exposed ends of the inserted reinforcing elements flush as was done in the Boyce patent (see Fig. 7, column 4, lines 2-5), the reinforcing elements should be left extending and then, when two such parts are joined, the extending reinforcing elements remarkably increase the joint strength between the two parts.

The Examiner has objected to the specification under 35 USC Section 112 first paragraph. In particular, the Examiner has stated that "reinforcing elements" encompass steel reinforcing rods used in building construction, not contemplated by the disclosure. Further, the Examiner states that the specification discloses adhesives and braze materials suitable as adherents but that the claims are not so limited.

Note what the Court of Appeals for the Federal Circuit has delineated with regard to enablement of a patent:

Enablement is a legal determination of whether a patent enables one skilled in the art to make and use the claimed invention, ... It is not precluded even though some experimentation is necessary, although the amount of experimentation must not be unduly extensive, ... Further, a patent need not teach, and preferably omits, what is well known in the art.

Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986).

As illustrated in Fig. 2, applicant's invention involves joining two structures (stiffener 12 and composite part 10). Each is called an "adherend". Reinforcing elements 16 are injected through both structures so that a portion of these elements are exposed in the area of the joint region. The reinforcing elements used differ by application, but for purposes of example they may be boron filaments, iron or aluminum rods or other analogous structures used to reinforce these "adherends". After the reinforcing elements are driven into the "adherends", (e.g. per the methodology shown in Boyce) an "adherent interlayer", usually a film, braze, adhesive or prepreg material, is disposed into the joint region between the two "adherends". Pressure is then used to drive the two "adherends" towards each other and the "adherent" in the now closing joint region. This pressure then drives the extended portions of the reinforcing elements through the "adherent" and into the opposing "adherend" to create and further strengthen this bond. The joint between the two adherends contains the extending reinforcing elements surrounded by the adherent.

Applicants therefore submit that to one skilled in the art of joining composites, reinforcing elements would encompass materials appropriate for this type of application

(e.g. aluminum, boron, carbon, graphite, silicon carbide, etc...of the appropriate size diameter and length). (See page 11, lines 1-2 of the specification). Those skilled in the art will readily understand that steel "rebar" as used in the building construction industry is probably inappropriate and inapplicable for this claimed area of art.

Applicant also submits that the Examiner has misunderstood the applicant's use of the term "adherends". As applicant states in the specification on page 10, line 6, "As used herein, "adherend" denotes one part or structure to be joined with another part or structure". Therefore, throughout applicant's claims and the disclosure, the term "adherends" encompasses the two structures to be joined (i.e. stiffener structure 12 and composite part 10, Fig. 1).

The Examiner misunderstands this term to mean only an adhesive or braze material. Applicant properly uses the term "adherent" to delineate the layer disposed between the "adherends" which may be an adhesive or braze material as the Examiner construes the term. Therefore applicant uses the term "adherent" to define the material, which used in conjunction with the previously described reinforcing elements, binds the two structures (the "adherends") to be joined . Therefore, applicant believes that the 35 USC §112 first paragraph rejection is traversed. (See the enclosed sketch for further clarification).

The Examiner also rejects claims 1, 3, 7, 9-15 and 19

under 35 USC §103 as being unpatentable over Boyce et al.

- The Examiner states that Boyce teaches inserting reinforcing elements into a single improved composite part 10. This is accomplished by positioning the reinforcing structures 10 (a thermally decomposable foam) at desired locations on graphite epoxy prepreg composite layup 30; continually applying pressure which drives the array of filaments 14 of the reinforcing structure 10 through the laminate 30 to impinge on support tool 32; after which the epoxy laminate 30 is cured and then the exposed ends 52 of the reinforcing elements 14 are ground flush as indicated in Fig. 7.

The examiner correctly states that the reinforcement structure includes a body of thermally decomposable material with a plurality of reinforcing elements in this body. The Examiner then goes on to explain that this body is subjected to elevated temperatures and pressure to insert the reinforcing elements into the composite structure as the body of thermally decomposable material collapses under the influence of the elevated temperature and pressure.

Therefore this body, reinforcing structure 10 including body 12 of a polyvinyl foam material, is not joined with prepreg composite lay up 30. Moreover, this thermally decomposable material not only collapses but melts away and is no longer a functioning entity after step 2, Fig. 5 in the Boyce et al. method.

In stark contrast, applicant claims a method of joining

two composite parts. A plurality of reinforcing elements are disposed through the thickness of two composite adherends to be joined. Applicant's further claim that in so assembling the adherends, the joint surface of one adherend faces the joint surface of the other adherend defining a joint region therebetween. Boyce does not teach two parts to be joined as claimed by the applicant and instead teaches a thermally decomposable foam body used to insert reinforcing elements into one part. Boyce does not teach a joint surface or a joint region as claimed by the applicant. Boyce does not teach leaving the reinforcing elements extending in the joint region as claimed by the applicant.

In Boyce, reinforcing structure 10 and prepreg composite layup 30 are not adherends because they are not two parts to be joined. Reinforcing structure 10, including a body 12 of thermally decomposable foam material, is only used as a means of injecting the boron filaments 14 into the prepreg composite layup 30. Boyce further goes on to claim (see claim 22) that the method includes the steps of "removing the residue of the collapsed thermally decomposable material from said [single] composite structure". Foam body 12 cannot be deemed an adherend as claimed by the applicant. Therefore, Boyce does not teach nor infer the use of applicant's claimed method for joining two composite structures. Moreover, Boyce does not suggest

any modification or extension of the disclosure which would encompass the applicant's claimed system.

As the Board of Appeals said in Ex parte Linder, 105 USPQ 245, 247 (1955) in overruling a rejection based on a modification not actually suggested in the art cited:

Appellant correctly contends that this structure in Dreis in no way teaches or suggests using such a cam mechanism for moving roll e of Hahnemann to and from bending position. As to this reference, the examiner's position as given on page 6 of the Answer is:

'It is contended by the examiner that it is not necessary to the validity of the rejection that the proposed change in Hahnemann's device be taught by the references, since the advantage of a quick-acting adjusting mechanism for the roll e of the device named is obvious.'

With such a viewpoint we cannot agree. Where an improvement pertains to utilizing old means in a new relationship to give an advantageous result, a rejection to be proper must be on art that may reasonably be held to teach or clearly suggest the relationship necessary to get the advantageous result. We hold that the Dreis patent contains nothing pertinent to the subject matter claimed in the instant case insofar as it pertains to cam means for moving a roll to and from bending position (emphasis added).

Indeed, as the CCPA held in In re Civitello, 144 USPQ 10, 12 (1964), rejection would be especially improper here since, as a matter of fact, many of applicant's claimed features

are not even shown, even by themselves, in any of the previously cited prior art references:

Since. . .[the reference] fails to disclose the feature of the claim relied on, we do not agree with the Patent Office that it would suggest modifying the. . .[prior art device] to contain that feature. The Patent Office finds the suggestion only after making a modification which is not suggested, as we see it, by anything other than appellant's own disclosure. This is hindsight reconstruction. It does not establish obviousness. We therefore find claim 2 allowable over the references applied.

It is urged, thus, that the relationships necessary to give applicant's new and advantageous result are plainly not obvious in view of the prior art of record. Therefore, applicant's claimed invention is not obvious over Boyce because Boyce does not disclose or suggest any the modification foam body rod insert technique such that it encompasses applicant's claimed invention.

Therefore, applicant respectfully assert that Boyce does not render applicant's claimed invention obvious. In fact, Boyce is only a distant precursor to the technology applicant is now claiming. Not only does Boyce not include joining of two composite parts but further fails to claim the use of an adherent within the joint region between these two parts for purposes of reinforcing and further adhering these two composite parts together. Therefore, applicant's submit that Boyce is not a proper reference to preclude

patentability under 35 USC §103.

SUMMARY

Applicants claim the joining of two composite parts using reinforcing elements and disposing an adherent between the joined region between these parts. Boyce et al neither discloses nor infers adjoining of two composite parts.

Boyce only teaches the reinforcement of a single composite or laminate by using reinforcing elements and a method for disposing those reinforcing elements within the body of the composite or laminate. Further, Boyce does not legally infer the extension of this method to include the joining of more than one composite to another.

In a nutshell Boyce teaches reinforcing a single structure. Boyce even names the structure which injects the reinforcing elements, "reinforcing structure" 10, not joining structure 10 or first structure to be joined 10. In fact, Boyce does not use the term join or an analogous term any where in the abstract, claims or specification of his patent. Applicant joins two structures together using reinforcing elements and elevated pressure and temperature. Although this does involve some variety of different structures and elements dependant on a particular application, the crux of the invention is joining two "adherends" as defined by applicant.

Therefore, applicant's submits that Boyce cannot legally or technically be used to preclude patentability

under 35 USC §103.

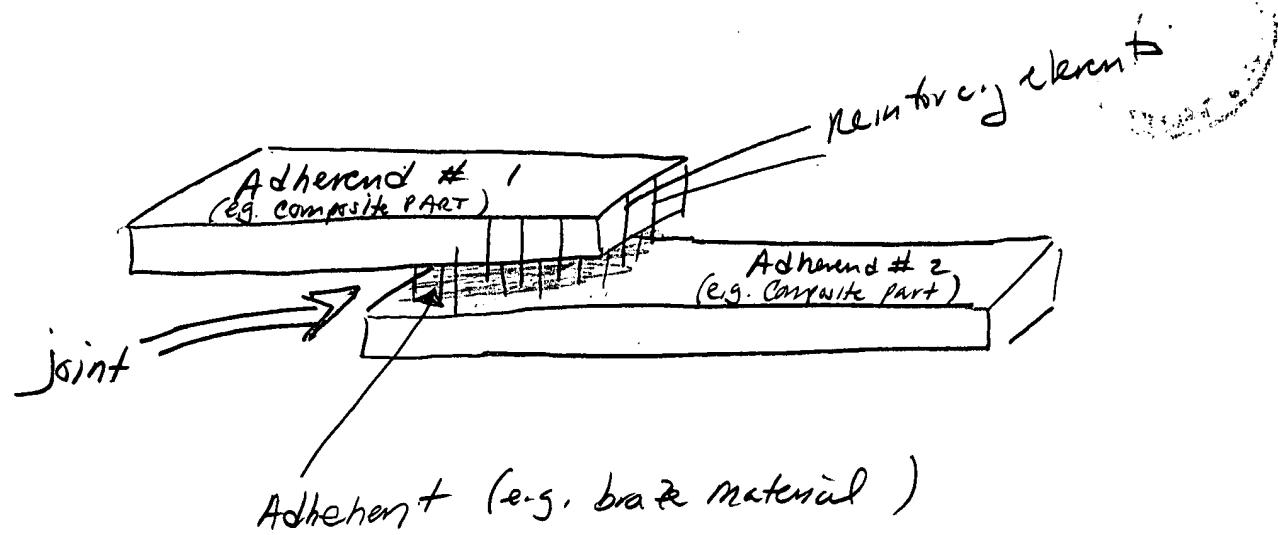
Each of Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associate, Joseph S. Iandiorio, collect in Waltham, Massachusetts, (617) 890-5678.

Respectfully submitted,

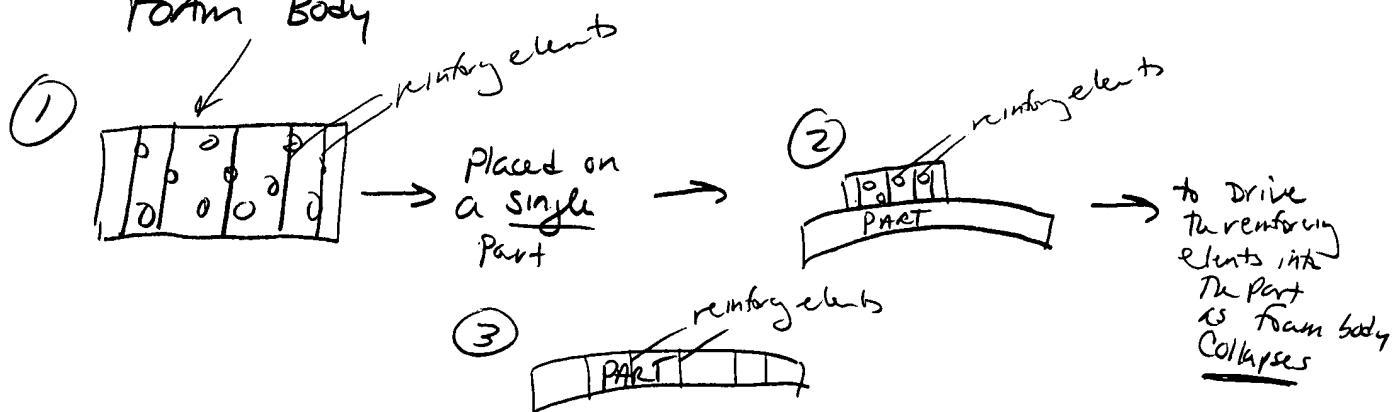


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Applicant

Permanently Decomposable
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Boyce